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Date: November 12, 2003

PATENT
TH-1396N (US)
HS:KNL

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of)	
)	
JOHN ROBERT LOCKEMEYER)	
)	
Serial No. 09/992,784)	Group Art Unit: 1725
)	
Filed November 6, 2001)	Examiner: C. A. Ildebrando
)	
CATALYST COMPOSITION)	November 12, 2003
)	

COMMISSIONER FOR PATENTS
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Alexandria, VA 22313-1450

Sir:

APPEAL BRIEF

The above Applicant hereby files this brief on appeal in triplicate containing their arguments as to why the final rejection of claims 1-49, dated May 19, 2003, should be overturned by the Board. Please charge the fee of \$330.00 for this brief to Shell Oil Company, Deposit Account No. 19-1800.

Real Party of Interest

The real party of interest is the assignee, Shell Oil Company.

Related Appeals and Interferences

There are no known related appeals or interferences.

Status of the Claims

Claims 1-53 were presented for examination. Claims 50-53 were cancelled. Applicant reserves the right to file and prosecute a divisional application related to

the subject matter of these claims 50-53. Claims 1-49 (cf. Appendix) are in the present Appeal.

Status of Amendments

The deletion of claims 50-53 was presented by amendment after the final rejection. According to the Advisory Action, dated July 15, 2003, the amendment will be entered upon appealing.

Summary of the Invention

The present invention provides a solution to the problem of improving the catalytic properties of certain supported catalysts, in particular silver-containing catalysts with specific promoters (sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, and rare earth metals, as defined in claim 1). An improved catalyst performance (activity and/or selectivity) was found by selecting a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes, and depositing the specific catalytically active components onto the carrier (cf. the present application at page 2, line 29 – page 3, line 2). Evidence for the advantages can be found in the working examples, cf. in particular Table II on page 19 and the explanation provided at page 20 of the present patent application.

Issues

The first issue presented upon this appeal is whether claims 1-5, 8-10, 13-18, 21-33, 36-42, and 45-49 are patentable under 35 U.S.C. § 102(b) over Thorsteinson et al. (U.S. Patent No. 5,187,140; “Thorsteinson”, hereinafter).

The second issue presented upon this appeal is whether claims 6-7, 19-20, 34-35, and 43-44 are patentable under 35 U.S.C. § 103(a) over Thorsteinson, as applied to claims 1-5, 8-10, 13-18, 21-33, 36-42, and 45-49 in the aforementioned issue under 35 U.S.C. § 102(b), in further view of Matusz (U.S. Patent No. 5,739,075).

The third issue presented upon this appeal is whether claims 1-6, 9-19, 22-34, 37-43, and 46-49 are patentable under 35 U.S.C. § 103(a) over Finch et al. (U.S. Patent No. 2,424,083, “Finch” hereinafter) in view of Notermann et al. (U.S. Patent No. 4,994,587, “Notermann” hereinafter).

The fourth issue presented upon this appeal is whether claims 7-8, 20-21, 35-36, and 44-45 are patentable under 35 U.S.C. § 103(a) over Finch in view of Notermann as applied to claims 1-6, 9-19, 22-34, 37-43, and 46-49, in the aforementioned issue under 35 U.S.C. § 103(a), and further in view of Matusz. In

raising the fourth issue, the Examiner relied upon the modified disclosure of Finch, discussed above, as applied to claims 1-6, 9-19, 22-34, 37-43, and 46-49.

Argument

The first issue presented upon this appeal is whether claims 1-5, 8-10, 13-18, 21-33, 36-42, and 45-49 are patentable under 35 U.S.C. § 102(b) over Thorsteinson.

Each of the claims rejected under 35 U.S.C. § 102(b) involves “a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes.” In rejecting the claims under 35 U.S.C. § 102(b), the Examiner asserted in the Office Action of December 18, 2002 that:

Thorsteinson et al. does not specifically disclose that the carrier has a sodium solubilization rate of no greater than 5 ppmw/5 minutes. However, the reference teaches that it is important to remove ions that may affect the performance of the catalyst (column 15, lines 20-30). Further, Thorsteinson et al. teaches a carrier “AJ” which is an alpha alumina carrier which is washed according to the following procedure: 30 minutes in boiling water, 6 times washed at 25 degrees C, each times 1000 cc carrier is washed with 1200 cc water, and dried at 300 degrees C (column 46, lines 5-11). The carrier has 51 ppm of leachable sodium impurities (column 46, lines 14-20). Given the low concentration of leachable sodium, it is considered that the treatment will inherently result in the solubilization rate that is instantly claimed. When the examiner has reason to believe that the functional language asserted to be critical for establishing novelty in claimed subject matter may in fact be an inherent characteristic of the prior art, the burden of proof is shifted to Applicants to prove that the subject matter shown in the prior art does not possess the characteristics relied upon.

Applicant respectfully submits that the Examiner has not satisfied the burden of proof required to maintain this rejection under 35 U.S.C. § 102(b). Before consideration of whether any burden of proof should be shifted onto Applicant, the initial burden of establishing a prima facie basis to deny patentability to a claimed invention rests upon the Examiner. *Ex parte Levy*, 17 U.S.P.Q.2d 1461, 1463-64 (Bd. Pat. App. & Inter. 1990). Furthermore, “[i]n relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art.” *Id.* at 1464 (emphasis in original). *See also In re Robertson*, 169 F.3d 743, 745, 49 U.S.P.Q.2d 1949, 1950-51 (Fed. Cir. 1999) (“To establish inherency, the extrinsic evidence ‘must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill.’”). “The mere fact that a certain thing *may* result from a given set of circumstances is not sufficient [to establish

inherency.]" *In re Rijckaert*, 9 F.3d 1531, 1534, 28 U.S.P.Q.2d 1955, 1957 (Fed. Cir. 1993) (emphasis in original); *see also In re Robertson*, 169 F.3d at 745, 49 U.S.P.Q.2d at 1951. Inherency may not be established by probabilities or possibilities. *In re Robertson*, 169 F.3d at 745, 49 U.S.P.Q.2d at 1951.

The Examiner's reasoning, quoted above in the block quote, does not reasonably support a determination that "a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes" necessarily flows from the teachings of Thorsteinson. Moreover, Applicant respectfully submits that the Examiner's interpretation of Thorsteinson does not reflect the intent of its teaching.

Thorsteinson teaches a process for the epoxidation of alkenes in the presence of a supported silver catalyst which has a high silver content, and the carrier has a high surface area and a high porosity (cf. col. 6, lines 24-33). The Examiner acknowledged that Thorsteinson does not specifically disclose that the carrier has a sodium solubilization rate of no greater than 5 ppmw/5 minutes, as quoted in the above quote block (cf. also Office Action of May 19, 2003, page 3, lines 5-18). In the Office Action of May 19, 2003, the Examiner then goes on submitting that "[Thorsteinson] teaches that it is important to remove ions that may affect the performance of the catalyst (column 15, lines 20-30)" (cf. the Office Action, page 3, lines 15-18).

It is respectfully submitted that the Examiner has erred in the latter submission. What Thorsteinson teaches in col. 15, lines 20-30) is that "[f]or the sake of repeatability, in the use and reuse of impregnation solutions the carrier should preferably not contain undue amounts of ions which are soluble in the impregnation solution and/or exchangeable with the promoter supplied to the catalyst, either in the preparation or use of the catalyst, so as to upset the amount of promoter which provides the desired catalyst enhancement. If the carrier contains such ions, the ions should be generally removed by standard chemical techniques such as leaching, otherwise they must be taken into account during the catalyst preparation."

One cannot reasonably read in this citation a teaching that ions should be removed that may affect the performance of the catalyst. Rather the citation teaches that if the impregnation solution is used and reused the presence of certain ions may upset the amount of promoter in the impregnation solution, and in such a case there is a choice of removing such ions or taking them into account during the catalyst

preparation. In col. 15, lines 20-30, Thorsteinson does not mention specific ions and, in particular, Thorsteinson is silent with respect to sodium ions.

Still further, Applicant respectfully submits that –as shown in the subsequent paragraphs– the novelty of the present claims over Thorsteinson can be stated independent of whether or not Carrier AJ inherently meets the solubilization rate instantly claimed. The Examiner specifically referred to Thorsteinson’s Carrier “AJ”, which is a water washed carrier having certain contents of impurities of fluoride, phosphate, aluminum, calcium, potassium, magnesium, sodium and silicon (column 46, lines 5-19), and the Examiner has submitted that Carrier AJ inherently meets the solubilization rate instantly claimed.

Carrier AJ was used in Thorsteinson’s Examples 108-116 (columns 55-56, Tables 31-33). In each impregnation in these examples (including the two-stage impregnations of Examples 111-116) a fresh impregnation solution was prepared and used. There is no example in Thorsteinson in which an impregnation solution was used and reused, as an illustration of the teaching of Thorsteinson’s column 15, lines 20-30. Also, there is no apparent connection between the cesium promoter used in Examples 108-116 and any of the stated impurities of Carrier AJ. Thorsteinson does not teach a reason why one would water-wash a carrier when there is no intention to use and reuse an impregnation solution, and in many of Thorsteinson’s Examples unwashed carriers were used which have vast amounts of impurities, apparently without taking them into account during the catalyst preparation. Thus, there is absolutely no link between the generic disclosures of Thorsteinson in column 15, lines 20-30, and any of the Examples, in particular the aspect of the water-washing yielding Carrier AJ and the stated impurities of Carrier AJ.

Thus, independent of whether or not Carrier AJ inherently meets the solubilization rate instantly claimed, in the generic disclosures of Thorsteinson there is no suggestion or teaching of using a carrier having a sodium solubilization rate of no greater than 5 ppmw/5 minutes for making a silver containing catalyst comprising one or more promoters selected from sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.

As indicated above, the Examples of Thorsteinson in which Carrier AJ was employed are Examples 108-116 only. Examples 108-116 mention cesium as the

single promoter, and these examples are silent with respect to promoters selected from sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, and rare earth metals.

Thus, independent of whether or not Carrier AJ inherently meets the solubilization rate instantly claimed, in the Examples of Thorsteinson there is no suggestion or teaching of using a carrier having a sodium solubilization rate of no greater than 5 ppmw/5 minutes for making a silver containing catalyst comprising one or more promoters selected from sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.

Thus, independent of whether or not Carrier AJ inherently meets the solubilization rate instantly claimed, in the entire disclosure of Thorsteinson there is no suggestion or teaching of using a carrier having a sodium solubilization rate of no greater than 5 ppmw/5 minutes for making a silver containing catalyst comprising one or more promoters selected from sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, rare earth metals, and combinations thereof, as recited in the present claims. This means that the claims are novel over Thorsteinson.

The Examiner has submitted that “[a]s each and every element of the claimed invention is taught in the prior art as recited above, the claims are anticipated Thorsteinson et al.” (Office Action of May 19, 2003, page 4, lines 8-9). It is respectfully submitted that the Examiner has erred in more than one respect in applying the reference’s teaching. Namely, as it has been set out above, Thorsteinson fails to suggest that removal of ions offers advantage in catalyst performance, and, independent of whether or not Carrier AJ inherently meets the solubilization rate instantly claimed, Thorsteinson fails to disclose, teach or suggest the element of the combination of using a carrier having a sodium solubilization rate of no greater than 5 ppmw/5 minutes and using one or more promoters selected from sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, and rare earth metals. For the purpose of 35 U.S.C. § 102, “[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently, in a single prior art reference. (Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631) It is respectfully submitted that this combination has been made for the very

first time in the context of the present invention, and that this combination is an explicit element of the wording of the claims now under consideration.

Thus, claims 1-5, 8-10, 13-18, 21-33, 36-42, and 45-49 are novel and patentable over Thorsteinson.

The second issue presented upon this appeal is whether claims 6-7, 19-20, 34-35, and 43-44 are patentable under 35 U.S.C. § 103(a) over Thorsteinson, as applied to claims 1-5, 8-10, 13-18, 21-33, 36-42, and 45-49 in the aforementioned issue under 35 U.S.C. § 102(b), in further view of Matusz.

Applicant's considerations relating to Thorsteinson presented under the first issue, above, are also relied upon in arguing the second issue.

Matusz teaches the preparation of improved supported silver catalysts for the epoxidation of olefins, by pre-doping, pre-treating or pre-impregnating the carrier with a salt of a rare earth metal and a salt of an alkaline earth metal and/or a Group VIII transition metal. Any of a large number of carriers or support materials may be used, for example alpha-alumina (cf. col. 2, lines 12-36; col. 4, lines 10-32; col. 15, lines 42-45).

Each of the presently rejected claims involves "sodium solubilization rates." Matusz, like Thorsteinson (as discussed above), is silent with respect to sodium solubilization rates and any effect which they have on the performance of a catalyst in an epoxidation process. It follows that any combination of Thorsteinson and Matusz could not teach or suggest the sodium solubilization rates involved in claims 6-7, 19-20, 34-35, and 43-44. Thus, the claims are unobvious and patentable over Thorsteinson in further view of Matusz.

The third issue presented upon this appeal is whether claims 1-6, 9-19, 22-34, 37-43, and 46-49 are patentable under 35 U.S.C. § 103(a) over Finch in view of Notermann.

Each of these claims involves "a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes." In rejecting these claims, the Examiner asserted in the Office Action of December 18, 2002 that:

Finch et al. does not disclose that the support is treated such that the sodium solubilization rate is no greater than 5 ppmw per 5 minutes.
Notermann et al. (US 4,994,587) discloses a catalytic system for epoxidation of alkenes. The catalyst comprises silver on a solid support (column 11, lines 55-60). The support has less than about 50 and most frequently less than about 20 ppm of

leachable sodium (column 11, lines 60-63). A preferred support material is alpha alumina (column 13, lines 1-2).

Notermann et al. teaches that improved results are obtained by using a support wherein the support contains low levels of leachable sodium (column 13, lines 28-35). Notermann et al. teaches that the presence of leachable sodium exhibits deactivating and effective life-shortening effects on the catalytic system (column 11, lines 18-25). The low sodium support can be prepared by any methods suitable for removing sodium from a solid (column 13, lines 40-45). Typically the techniques involve extraction and/or volatilization of the sodium present (column 13, lines 50-68). Prepared supports have BET surface areas of 1.56 m²/g (column 23, Example 1).

Notermann et al. does not specifically disclose that the sodium solubilization rate of the carrier is no greater than 5 ppmw/5 minutes. However, it is considered that because Notermann et al. teaches removing leachable sodium from the carrier material, the resulting material will have the solubilization rate instantly claimed.

The Examiner's rejection is based upon an assertion by the Examiner that Notermann inherently discloses "a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes." However, as discussed previously, to satisfy the Examiner's burden of proof, "the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." *Ex parte Levy*, 17 U.S.P.Q.2d 1461, 1464 (Bd. Pat. App. & Inter. 1990); *see also In re Robertson*, 169 F.3d 743, 745, 49 U.S.P.Q.2d 1949, 1950-51 (Fed. Cir. 1999).

The Examiner's reasoning, quoted above in the block quote, does not reasonably support a determination that "a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes" necessarily flows from the teachings of Notermann. Without more, a teaching of sodium removal and levels of leachable sodium, which the Examiner asserts are present in Notermann, provide insufficient basis for any determinations or estimations concerning whether a sodium solubilization rate is no greater than 5 ppmw/5 minutes. At best, the Examiner has proposed a mere possibility of what Notermann may inherently contain. For example, while the carrier as treated in Example 1 of Notermann by heating with NH₄F may have a relatively low sodium content, the carrier could possibly still have a relatively high sodium solubilization rate when contacted with water. Thus the Examiner has not satisfied the burden of proof required to maintain this rejection based on a theory of inherent disclosure. In addition, nowhere does Notermann teach or suggest selecting a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes and subsequently using the carrier for making a catalyst comprising silver and promoters selected from sulfur,

phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.

As acknowledged by the Examiner, “Finch et al. does not disclose that the support is treated such that the sodium solubilization rate is no greater than 5 ppmw per minutes” and “Notermann et al. does not specifically disclose that the sodium solubilization rate of the carrier is no greater than 5 ppmw/5 minutes.” Because each of the presently rejected claims involves “a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes,” any combination of Finch with Notermann could not teach or suggest claims 1-6, 9-19, 22-34, 37-43, and 46-49.

In the Office action of May 19, 2003, the Examiner submitted that “[i]t would have been obvious [...] to substitute the carrier taught by Finch with the carrier taught by Notermann [...] in the light of the suggestion of Notermann that the use of low sodium alumina carrier will obtain a catalyst with improved properties and avoid deleterious effect of leachable sodium” (cf. page 7, lines 10-15; Notermann, column 13, lines 28-35). However, it is respectfully submitted that the Examiner has based the rejections on a selective consideration of only portions of Notermann. According to the Manual of Patent Examining Procedure, 9th Edition, paragraph 2141.03, “[a] prior art reference must be considered in its entirety, i.e. as a whole, including portions that would lead away from the claimed invention” (emphasis added).

Applicant respectfully submits that the Examiner’s citation of Notermann’s column 13, lines 28-35 has to be read in conjunction with Notermann’s passage in column 11, lines 19-47, which teaches that different instances lead to different effects of leachable sodium, namely: “The presence of leachable sodium [...] tends, in some instances, to improve the efficiency of the system under epoxidation conditions generally used. In the presence of CO₂ and certain efficiency enhancing compounds, however, sodium exhibits deactivating and effective life-shortening effects on epoxidation catalysts and systems. [...] The catalyst and process of [Notermann’s] invention diminish the deactivating and life-shortening effects of CO₂” (emphasis added).

Thus, on the one hand, Notermann contains the general teaching that the presence of leachable sodium improves the efficiency under epoxidation conditions generally used, and, on the other hand, Notermann contains the specific teaching only applicable to cases of deactivating and life-shortening effects of CO₂, in which it is

advantageous to use Notermann's invention, i.e. to use a carrier with a low content of leachable sodium.

Finch teaches that "[t]he activity of the catalysts may, in many instances, be further materially increased or promoted by the addition of small amounts of a sodium compound" (cf. column 4, lines 44-47). Finch is completely silent about CO₂, as such, let alone any deactivating and life-shortening effects of CO₂.

Applicant respectfully submits that if the skilled person would have a reason to consult Notermann in relation to Finch's disclosures, in the absence of any reference in Finch to (effects of) CO₂, he would have motivation only to follow Notermann's general teaching that the presence of leachable sodium tends to improve the efficiency of the system". It is emphasized that this general teaching is consistent with the teaching by Finch that the activity of the catalysts may, in many instances, be further materially increased or promoted by the addition of small amounts of a sodium compound" (column 4, lines 44-47). Thus, the skilled person is discouraged from applying a carrier with a low content of leachable sodium, let alone a carrier with a low sodium solubilization rate, e.g. no greater than 5 ppmw/5 minutes. This clearly leads away from the present invention.

In the absence of any reference in Finch to (effects of) CO₂, the skilled person would not find any motivation to apply Notermann's specific teaching which aims at diminishing deactivating and life-shortening effects of CO₂ by using a carrier with a low content of leachable sodium. Preparing such carriers would also require elaborate procedures such as set out in Notermann's column 13, line 41 - column 14, line 65. As an addition, even if the skilled person would find motivation to apply a carrier with a low content of leachable sodium, then still he would not necessarily arrive at using a carrier with a low sodium solubilization rate, e.g. no greater than 5 ppmw/5 minutes.

In view of the above, it is respectfully submitted that the rejections, based on Finch and Notermann, are not based on a proper consideration of Notermann, and that a proper consideration of Notermann in its entirety leads to the conclusion that Notermann leads away from the present invention.

Thus, claims 1-6, 9-19, 22-34, 37-43, and 46-49 are unobvious and patentable over Finch in view of Notermann. The non-obviousness of the present claims over Finch and Notermann can be stated independent of whether or not Notermann's carrier inherently meets the solubilization rate instantly claimed.

The fourth issue presented upon this appeal is whether claims 7-8, 20-21, 35-36, and 44-45 are patentable under 35 U.S.C. § 103(a) over Finch in view of Notermann as applied to claims 1-6, 9-19, 22-34, 37-43, and 46-49, in the aforementioned issue under 35 U.S.C. § 103(a), and further in view of Matusz. In raising the present issue, the Examiner relied upon the modified disclosure of Finch, discussed above, as applied to claims 1-6, 9-19, 22-34, 37-43, and 46-49.

As shown above, the Examiner has not met the burden of proof necessary to support a theory of inherent disclosure by Notermann. Further, as shown above, Notermann and Finch cannot be properly combined in the manner proposed by the Examiner in the rejection of claims 1-6, 9-19, 22-34, 37-43, and 46-49 over these references. Thus reliance upon Finch in view of Notermann, as applied above by the Examiner to claims 1-6, 9-19, 22-34, 37-43, and 46-49, cannot properly support the rejections under 35 U.S.C. § 103 of claims 7-8, 20-21, 35-36, and 44-45.

As discussed previously, Finch, Notermann, and Matusz are all silent with respect to sodium solubilization rates. Because each of the presently rejected claims involves "a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes," any combination of these cited references could not teach or suggest the subject matter of claims 7-8, 20-21, 35-36, and 44-45. Therefore, these claims are unobvious and patentable over the cited art.

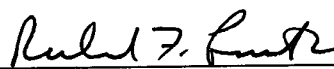
CONCLUSION

For the reasons set forth above, the Applicants request that the Board overturn the Examiner's rejection.

Respectfully submitted,

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APPENDIX

1. A process for preparing a catalyst, said process comprising:
selecting a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes;
depositing one or more catalytically reactive metals comprising silver on said carrier; and
depositing one or more promoters selected from sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, rare earth metals, and combinations thereof prior to, coincidentally with, or subsequent to the deposition of said one or more catalytically reactive metals.
2. A process according to claim 1 wherein the one or more promoters comprise lithium.
3. A process according to claim 2 wherein the one or more promoters comprise in addition a Group IA metal which is selected from potassium, rubidium, cesium, sodium, and combinations thereof.
4. A process according to claim 1 wherein the one or more promoters are selected from sulfur, phosphorus, boron, fluorine, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.
5. A process according to claim 4 wherein said Group IIA metal is selected from magnesium, calcium, strontium, barium, and combinations thereof.
6. A process according to claim 4 wherein said Group VIII metal is selected from cobalt, iron, nickel, ruthenium, rhodium, palladium, and combinations thereof.
7. A process according to claim 4 wherein said rare earth metal is selected from lanthanum, cerium, neodymium, samarium, gadolinium, dysprosium, erbium, ytterbium, and combinations thereof.
8. A process according to claim 4 wherein the one or more promoters comprise rhenium.
9. A process according to claim 1 wherein said sodium solubilization rate has been achieved by a means effective in rendering ionizable species on the carrier surface ionic and removing that species, or rendering the ionizable species insoluble, or rendering the ionizable species immobile.

10. A process according to claim 9 wherein said means is selected from washing, ion exchange, volatilizing, impurity control, precipitation, sequestration, and combinations thereof.
11. A process according to claim 1 wherein said metal is deposited on said carrier by submersing said carrier in an impregnation solution wherein a hydrogen ion activity of said solution is lowered.
12. A process according to claim 11 wherein said hydrogen ion activity is lowered by addition of a base to said impregnation solution.
13. A process for preparing a catalyst suitable for the vapor phase production of epoxides, said process comprising:
- selecting a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes;
 - depositing one or more catalytically reactive metals comprising silver on said carrier; and
 - depositing one or more promoters selected from sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, rare earth metals, and combinations thereof prior to, coincidentally with, or subsequent to the deposition of said one or more catalytically reactive metals.
14. A process according to claim 13 wherein the one or more promoters comprise lithium.
15. A process according to claim 14 wherein the one or more promoters comprise in addition a Group IA metal which is selected from potassium, rubidium, cesium, sodium, and combinations thereof.
16. A process according to claim 14 wherein the one or more promoters comprise in addition a Group IA metal which is cesium.
17. A process according to claim 13 wherein the one or more promoters are selected from sulfur, phosphorus, boron, fluorine, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.
18. A process according to claim 17 wherein said Group IIA metal is selected from magnesium, calcium, strontium, barium, and combinations thereof.
19. A process according to claim 17 wherein said Group VIII metal is selected from cobalt, iron, nickel, ruthenium, rhodium, palladium, and combinations thereof.

20. A process according to claim 17 wherein said rare earth metal is selected from lanthanum, cerium, neodymium, samarium, gadolinium, dysprosium, erbium, ytterbium, and combinations thereof.
21. A process according to claim 17 wherein the one or more promoters comprise rhenium.
22. A process according to claim 13 wherein said sodium solubilization rate has been achieved by a means effective in rendering the ionizable species ionic and removing that species, or rendering the ionizable species insoluble, or rendering the ionizable species immobile.
23. A process according to claim 22 wherein said means is selected from washing, ion exchange, volatilizing, impurity control, precipitation, sequestration, and combinations thereof.
24. A process according to claim 13 wherein said carrier is an alumina-based carrier.
25. A process according to claim 24 wherein said alumina-based carrier is α -alumina.
26. A process according to claim 13 wherein the amount of a Group IA metal, if present, is in the range of from about 10 ppm to about 1500 ppm, by weight of the total catalyst, expressed as the metal; the amount of a Group VII B metal, if present, is less than about 3600 ppm, by weight of the total catalyst, expressed as the metal; and the amount of silver is in the range of from about 1 percent by weight to about 40 percent by weight of the total catalyst.
27. A process according to claim 13 wherein said carrier has a surface area in the range of from about 0.05 m²/g to about 10 m²/g.
28. A catalyst comprising a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes; and deposited on said carrier a catalytically effective amount of one or more catalytically reactive metals comprising silver, and one or more promoters selected from sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.
29. A catalyst according to claim 28 wherein the one or more promoters comprise lithium.

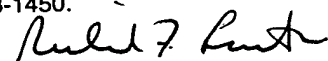
30. A catalyst according to claim 29 wherein the one or more promoters comprise in addition a Group IA metal which is selected from potassium, rubidium, cesium, sodium, and combinations thereof.
31. A catalyst according to claim 29 wherein the one or more promoters comprise in addition a Group IA metal which is cesium.
32. A catalyst according to claim 28 wherein the one or more promoters are selected from sulfur, phosphorus, boron, fluorine, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.
33. A catalyst according to claim 32 wherein said Group IIA metal is selected from magnesium, calcium, strontium, barium, and combinations thereof.
34. A catalyst according to claim 32 wherein said Group VIII metal is selected from cobalt, iron, nickel, ruthenium, rhodium, palladium, and combinations thereof.
35. A catalyst according to claim 32 wherein said rare earth metal is selected from lanthanum, cerium, neodymium, samarium, gadolinium, dysprosium, erbium, ytterbium, and combinations thereof.
36. A catalyst according to claim 32 wherein the one or more promoters comprise rhenium.
37. A catalyst suitable for the vapor phase production of epoxides comprising a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes; and deposited on said carrier a catalytically effective amount of one or more catalytically reactive metals comprising silver, and one or more promoters selected from sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.
38. A catalyst according to claim 37 wherein the one or more promoters comprise lithium.
39. A catalyst according to claim 38 wherein the one or more promoters comprise in addition a Group IA metal which is selected from potassium, rubidium, cesium, sodium, and combinations thereof.
40. A catalyst according to claim 38 wherein the one or more promoters comprise in addition a Group IA metal which is cesium.
41. A catalyst according to claim 37 wherein the one or more promoters are selected from sulfur, phosphorus, boron, fluorine, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.

42. A catalyst according to claim 41 wherein said Group IIA metal is selected from magnesium, calcium, strontium, barium, and combinations thereof.
43. A catalyst according to claim 41 wherein said Group VIII metal is selected from cobalt, iron, nickel, ruthenium, rhodium, palladium, and combinations thereof.
44. A catalyst according to claim 41 wherein said rare earth metal is selected from lanthanum, cerium, neodymium, samarium, gadolinium, dysprosium, erbium, ytterbium, and combinations thereof.
45. A catalyst according to claim 41 wherein the one or more promoters comprise rhenium.
46. A catalyst according to claim 37 wherein said carrier is an alumina-based carrier.
47. A catalyst according to claim 46 wherein said alumina-based carrier is α -alumina.
48. A catalyst according to claim 37 wherein the amount of a Group IA metal, if present, is in the range of from about 10 ppm to about 1500 ppm, by weight of the total catalyst, expressed as the metal; the amount of a Group VIIB metal, if present, is less than about 3600 ppm, by weight of the total catalyst, expressed as the metal; and the amount of silver is in the range of from about 1 percent by weight to about 40 percent by weight of the total catalyst.
49. A catalyst according to claim 37 wherein said carrier has a surface area in the range of from about 0.05 m²/g to about 10 m²/g.



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Richard F. Lemuth

Date: November 12, 2003

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of)	
)	
JOHN ROBERT LOCKEMEYER)	
)	
Serial No. 09/992,784)	Group Art Unit: 1725
)	
Filed November 6, 2001)	Examiner: C. A. Ildebrando
)	
CATALYST COMPOSITION)	November 12, 2003
)	

COMMISSIONER FOR PATENTS
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

APPEAL BRIEF

The above Applicant hereby files this brief on appeal in triplicate containing their arguments as to why the final rejection of claims 1-49, dated May 19, 2003, should be overturned by the Board. Please charge the fee of \$330.00 for this brief to Shell Oil Company, Deposit Account No. 19-1800.

Real Party of Interest

The real party of interest is the assignee, Shell Oil Company.

Related Appeals and Interferences

There are no known related appeals or interferences.

Status of the Claims

Claims 1-53 were presented for examination. Claims 50-53 were cancelled. Applicant reserves the right to file and prosecute a divisional application related to

the subject matter of these claims 50-53. Claims 1-49 (cf. Appendix) are in the present Appeal.

Status of Amendments

The deletion of claims 50-53 was presented by amendment after the final rejection. According to the Advisory Action, dated July 15, 2003, the amendment will be entered upon appealing.

Summary of the Invention

The present invention provides a solution to the problem of improving the catalytic properties of certain supported catalysts, in particular silver-containing catalysts with specific promoters (sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, and rare earth metals, as defined in claim 1). An improved catalyst performance (activity and/or selectivity) was found by selecting a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes, and depositing the specific catalytically active components onto the carrier (cf. the present application at page 2, line 29 – page 3, line 2). Evidence for the advantages can be found in the working examples, cf. in particular Table II on page 19 and the explanation provided at page 20 of the present patent application.

Issues

The first issue presented upon this appeal is whether claims 1-5, 8-10, 13-18, 21-33, 36-42, and 45-49 are patentable under 35 U.S.C. § 102(b) over Thorsteinson et al. (U.S. Patent No. 5,187,140; "Thorsteinson", hereinafter).

The second issue presented upon this appeal is whether claims 6-7, 19-20, 34-35, and 43-44 are patentable under 35 U.S.C. § 103(a) over Thorsteinson, as applied to claims 1-5, 8-10, 13-18, 21-33, 36-42, and 45-49 in the aforementioned issue under 35 U.S.C. § 102(b), in further view of Matusz (U.S. Patent No. 5,739,075).

The third issue presented upon this appeal is whether claims 1-6, 9-19, 22-34, 37-43, and 46-49 are patentable under 35 U.S.C. § 103(a) over Finch et al. (U.S. Patent No. 2,424,083, "Finch" hereinafter) in view of Notermann et al. (U.S. Patent No. 4,994,587, "Notermann" hereinafter).

The fourth issue presented upon this appeal is whether claims 7-8, 20-21, 35-36, and 44-45 are patentable under 35 U.S.C. § 103(a) over Finch in view of Notermann as applied to claims 1-6, 9-19, 22-34, 37-43, and 46-49, in the aforementioned issue under 35 U.S.C. § 103(a), and further in view of Matusz. In

raising the fourth issue, the Examiner relied upon the modified disclosure of Finch, discussed above, as applied to claims 1-6, 9-19, 22-34, 37-43, and 46-49.

Argument

The first issue presented upon this appeal is whether claims 1-5, 8-10, 13-18, 21-33, 36-42, and 45-49 are patentable under 35 U.S.C. § 102(b) over Thorsteinson.

Each of the claims rejected under 35 U.S.C. § 102(b) involves “a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes.” In rejecting the claims under 35 U.S.C. § 102(b), the Examiner asserted in the Office Action of December 18, 2002 that:

Thorsteinson et al. does not specifically disclose that the carrier has a sodium solubilization rate of no greater than 5 ppmw/5 minutes. However, the reference teaches that it is important to remove ions that may affect the performance of the catalyst (column 15, lines 20-30). Further, Thorsteinson et al. teaches a carrier “AJ” which is an alpha alumina carrier which is washed according to the following procedure: 30 minutes in boiling water, 6 times washed at 25 degrees C, each times 1000 cc carrier is washed with 1200 cc water, and dried at 300 degrees C (column 46, lines 5-11). The carrier has 51 ppm of leachable sodium impurities (column 46, lines 14-20). Given the low concentration of leachable sodium, it is considered that the treatment will inherently result in the solubilization rate that is instantly claimed. When the examiner has reason to believe that the functional language asserted to be critical for establishing novelty in claimed subject matter may in fact be an inherent characteristic of the prior art, the burden of proof is shifted to Applicants to prove that the subject matter shown in the prior art does not possess the characteristics relied upon.

Applicant respectfully submits that the Examiner has not satisfied the burden of proof required to maintain this rejection under 35 U.S.C. § 102(b). Before consideration of whether any burden of proof should be shifted onto Applicant, the initial burden of establishing a prima facie basis to deny patentability to a claimed invention rests upon the Examiner. *Ex parte Levy*, 17 U.S.P.Q.2d 1461, 1463-64 (Bd. Pat. App. & Inter. 1990). Furthermore, “[i]n relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art.” *Id.* at 1464 (emphasis in original). *See also In re Robertson*, 169 F.3d 743, 745, 49 U.S.P.Q.2d 1949, 1950-51 (Fed. Cir. 1999) (“To establish inherency, the extrinsic evidence ‘must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill.’”). “The mere fact that a certain thing *may* result from a given set of circumstances is not sufficient [to establish

inherency.]” *In re Rijckaert*, 9 F.3d 1531, 1534, 28 U.S.P.Q.2d 1955, 1957 (Fed. Cir. 1993) (emphasis in original); *see also In re Robertson*, 169 F.3d at 745, 49 U.S.P.Q.2d at 1951. Inherency may not be established by probabilities or possibilities. *In re Robertson*, 169 F.3d at 745, 49 U.S.P.Q.2d at 1951.

The Examiner’s reasoning, quoted above in the block quote, does not reasonably support a determination that “a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes” necessarily flows from the teachings of Thorsteinson. Moreover, Applicant respectfully submits that the Examiner’s interpretation of Thorsteinson does not reflect the intent of its teaching.

Thorsteinson teaches a process for the epoxidation of alkenes in the presence of a supported silver catalyst which has a high silver content, and the carrier has a high surface area and a high porosity (cf. col. 6, lines 24-33). The Examiner acknowledged that Thorsteinson does not specifically disclose that the carrier has a sodium solubilization rate of no greater than 5 ppmw/5 minutes, as quoted in the above quote block (cf. also Office Action of May 19, 2003, page 3, lines 5-18). In the Office Action of May 19, 2003, the Examiner then goes on submitting that “[Thorsteinson] teaches that it is important to remove ions that may affect the performance of the catalyst (column 15, lines 20-30)” (cf. the Office Action, page 3, lines 15-18).

It is respectfully submitted that the Examiner has erred in the latter submission. What Thorsteinson teaches in col. 15, lines 20-30) is that “[f]or the sake of repeatability, in the use and reuse of impregnation solutions the carrier should preferably not contain undue amounts of ions which are soluble in the impregnation solution and/or exchangeable with the promoter supplied to the catalyst, either in the preparation or use of the catalyst, so as to upset the amount of promoter which provides the desired catalyst enhancement. If the carrier contains such ions, the ions should be generally removed by standard chemical techniques such as leaching, otherwise they must be taken into account during the catalyst preparation.”

One cannot reasonably read in this citation a teaching that ions should be removed that may affect the performance of the catalyst. Rather the citation teaches that if the impregnation solution is used and reused the presence of certain ions may upset the amount of promoter in the impregnation solution, and in such a case there is a choice of removing such ions or taking them into account during the catalyst

preparation. In col. 15, lines 20-30, Thorsteinson does not mention specific ions and, in particular, Thorsteinson is silent with respect to sodium ions.

Still further, Applicant respectfully submits that –as shown in the subsequent paragraphs– the novelty of the present claims over Thorsteinson can be stated independent of whether or not Carrier AJ inherently meets the solubilization rate instantly claimed. The Examiner specifically referred to Thorsteinson's Carrier "AJ", which is a water washed carrier having certain contents of impurities of fluoride, phosphate, aluminum, calcium, potassium, magnesium, sodium and silicon (column 46, lines 5-19), and the Examiner has submitted that Carrier AJ inherently meets the solubilization rate instantly claimed.

Carrier AJ was used in Thorsteinson's Examples 108-116 (columns 55-56, Tables 31-33). In each impregnation in these examples (including the two-stage impregnations of Examples 111-116) a fresh impregnation solution was prepared and used. There is no example in Thorsteinson in which an impregnation solution was used and reused, as an illustration of the teaching of Thorsteinson's column 15, lines 20-30. Also, there is no apparent connection between the cesium promoter used in Examples 108-116 and any of the stated impurities of Carrier AJ. Thorsteinson does not teach a reason why one would water-wash a carrier when there is no intention to use and reuse an impregnation solution, and in many of Thorsteinson's Examples unwashed carriers were used which have vast amounts of impurities, apparently without taking them into account during the catalyst preparation. Thus, there is absolutely no link between the generic disclosures of Thorsteinson in column 15, lines 20-30, and any of the Examples, in particular the aspect of the water-washing yielding Carrier AJ and the stated impurities of Carrier AJ.

Thus, independent of whether or not Carrier AJ inherently meets the solubilization rate instantly claimed, in the generic disclosures of Thorsteinson there is no suggestion or teaching of using a carrier having a sodium solubilization rate of no greater than 5 ppmw/5 minutes for making a silver containing catalyst comprising one or more promoters selected from sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.

As indicated above, the Examples of Thorsteinson in which Carrier AJ was employed are Examples 108-116 only. Examples 108-116 mention cesium as the

single promoter, and these examples are silent with respect to promoters selected from sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, and rare earth metals.

Thus, independent of whether or not Carrier AJ inherently meets the solubilization rate instantly claimed, in the Examples of Thorsteinson there is no suggestion or teaching of using a carrier having a sodium solubilization rate of no greater than 5 ppmw/5 minutes for making a silver containing catalyst comprising one or more promoters selected from sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.

Thus, independent of whether or not Carrier AJ inherently meets the solubilization rate instantly claimed, in the entire disclosure of Thorsteinson there is no suggestion or teaching of using a carrier having a sodium solubilization rate of no greater than 5 ppmw/5 minutes for making a silver containing catalyst comprising one or more promoters selected from sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, rare earth metals, and combinations thereof, as recited in the present claims. This means that the claims are novel over Thorsteinson.

The Examiner has submitted that “[a]s each and every element of the claimed invention is taught in the prior art as recited above, the claims are anticipated Thorsteinson et al.” (Office Action of May 19, 2003, page 4, lines 8-9). It is respectfully submitted that the Examiner has erred in more than one respect in applying the reference’s teaching. Namely, as it has been set out above, Thorsteinson fails to suggest that removal of ions offers advantage in catalyst performance, and, independent of whether or not Carrier AJ inherently meets the solubilization rate instantly claimed, Thorsteinson fails to disclose, teach or suggest the element of the combination of using a carrier having a sodium solubilization rate of no greater than 5 ppmw/5 minutes and using one or more promoters selected from sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, and rare earth metals. For the purpose of 35 U.S.C. § 102, “[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently, in a single prior art reference. (Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631) It is respectfully submitted that this combination has been made for the very

first time in the context of the present invention, and that this combination is an explicit element of the wording of the claims now under consideration.

Thus, claims 1-5, 8-10, 13-18, 21-33, 36-42, and 45-49 are novel and patentable over Thorsteinson.

The second issue presented upon this appeal is whether claims 6-7, 19-20, 34-35, and 43-44 are patentable under 35 U.S.C. § 103(a) over Thorsteinson, as applied to claims 1-5, 8-10, 13-18, 21-33, 36-42, and 45-49 in the aforementioned issue under 35 U.S.C. § 102(b), in further view of Matusz.

Applicant's considerations relating to Thorsteinson presented under the first issue, above, are also relied upon in arguing the second issue.

Matusz teaches the preparation of improved supported silver catalysts for the epoxidation of olefins, by pre-doping, pre-treating or pre-impregnating the carrier with a salt of a rare earth metal and a salt of an alkaline earth metal and/or a Group VIII transition metal. Any of a large number of carriers or support materials may be used, for example alpha-alumina (cf. col. 2, lines 12-36; col. 4, lines 10-32; col. 15, lines 42-45).

Each of the presently rejected claims involves "sodium solubilization rates." Matusz, like Thorsteinson (as discussed above), is silent with respect to sodium solubilization rates and any effect which they have on the performance of a catalyst in an epoxidation process. It follows that any combination of Thorsteinson and Matusz could not teach or suggest the sodium solubilization rates involved in claims 6-7, 19-20, 34-35, and 43-44. Thus, the claims are unobvious and patentable over Thorsteinson in further view of Matusz.

The third issue presented upon this appeal is whether claims 1-6, 9-19, 22-34, 37-43, and 46-49 are patentable under 35 U.S.C. § 103(a) over Finch in view of Notermann.

Each of these claims involves "a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes." In rejecting these claims, the Examiner asserted in the Office Action of December 18, 2002 that:

Finch et al. does not disclose that the support is treated such that the sodium solubilization rate is no greater than 5 ppmw per 5 minutes.
Notermann et al. (US 4,994,587) discloses a catalytic system for epoxidation of alkenes. The catalyst comprises silver on a solid support (column 11, lines 55-60). The support has less than about 50 and most frequently less than about 20 ppm of

leachable sodium (column 11, lines 60-63). A preferred support material is alpha alumina (column 13, lines 1-2).

Notermann et al. teaches that improved results are obtained by using a support wherein the support contains low levels of leachable sodium (column 13, lines 28-35). Notermann et al. teaches that the presence of leachable sodium exhibits deactivating and effective life-shortening effects on the catalytic system (column 11, lines 18-25). The low sodium support can be prepared by any methods suitable for removing sodium from a solid (column 13, lines 40-45). Typically the techniques involve extraction and/or volatilization of the sodium present (column 13, lines 50-68). Prepared supports have BET surface areas of 1.56 m²/g (column 23, Example 1).

Notermann et al. does not specifically disclose that the sodium solubilization rate of the carrier is no greater than 5 ppmw/5 minutes. However, it is considered that because Notermann et al. teaches removing leachable sodium from the carrier material, the resulting material will have the solubilization rate instantly claimed.

The Examiner's rejection is based upon an assertion by the Examiner that Notermann inherently discloses "a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes." However, as discussed previously, to satisfy the Examiner's burden of proof, "the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." *Ex parte Levy*, 17 U.S.P.Q.2d 1461, 1464 (Bd. Pat. App. & Inter. 1990); *see also In re Robertson*, 169 F.3d 743, 745, 49 U.S.P.Q.2d 1949, 1950-51 (Fed. Cir. 1999).

The Examiner's reasoning, quoted above in the block quote, does not reasonably support a determination that "a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes" necessarily flows from the teachings of Notermann. Without more, a teaching of sodium removal and levels of leachable sodium, which the Examiner asserts are present in Notermann, provide insufficient basis for any determinations or estimations concerning whether a sodium solubilization rate is no greater than 5 ppmw/5 minutes. At best, the Examiner has proposed a mere possibility of what Notermann may inherently contain. For example, while the carrier as treated in Example 1 of Notermann by heating with NH₄F may have a relatively low sodium content, the carrier could possibly still have a relatively high sodium solubilization rate when contacted with water. Thus the Examiner has not satisfied the burden of proof required to maintain this rejection based on a theory of inherent disclosure. In addition, nowhere does Notermann teach or suggest selecting a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes and subsequently using the carrier for making a catalyst comprising silver and promoters selected from sulfur,

phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.

As acknowledged by the Examiner, "Finch et al. does not disclose that the support is treated such that the sodium solubilization rate is no greater than 5 ppmw per minutes" and "Notermann et al. does not specifically disclose that the sodium solubilization rate of the carrier is no greater than 5 ppmw/5 minutes." Because each of the presently rejected claims involves "a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes," any combination of Finch with Notermann could not teach or suggest claims 1-6, 9-19, 22-34, 37-43, and 46-49.

In the Office action of May 19, 2003, the Examiner submitted that "[i]t would have been obvious [...] to substitute the carrier taught by Finch with the carrier taught by Notermann [...] in the light of the suggestion of Notermann that the use of low sodium alumina carrier will obtain a catalyst with improved properties and avoid deleterious effect of leachable sodium" (cf. page 7, lines 10-15; Notermann, column 13, lines 28-35). However, it is respectfully submitted that the Examiner has based the rejections on a selective consideration of only portions of Notermann. According to the Manual of Patent Examining Procedure, 9th Edition, paragraph 2141.03, "[a] prior art reference must be considered in its entirety, i.e. as a whole, including portions that would lead away from the claimed invention" (emphasis added).

Applicant respectfully submits that the Examiner's citation of Notermann's column 13, lines 28-35 has to be read in conjunction with Notermann's passage in column 11, lines 19-47, which teaches that different instances lead to different effects of leachable sodium, namely: "The presence of leachable sodium [...] tends, in some instances, to improve the efficiency of the system under epoxidation conditions generally used. In the presence of CO₂ and certain efficiency enhancing compounds, however, sodium exhibits deactivating and effective life-shortening effects on epoxidation catalysts and systems. [...] The catalyst and process of [Notermann's] invention diminish the deactivating and life-shortening effects of CO₂" (emphasis added).

Thus, on the one hand, Notermann contains the general teaching that the presence of leachable sodium improves the efficiency under epoxidation conditions generally used, and, on the other hand, Notermann contains the specific teaching only applicable to cases of deactivating and life-shortening effects of CO₂, in which it is

advantageous to use Notermann's invention, i.e. to use a carrier with a low content of leachable sodium.

Finch teaches that "[t]he activity of the catalysts may, in many instances, be further materially increased or promoted by the addition of small amounts of a sodium compound" (cf. column 4, lines 44-47). Finch is completely silent about CO₂, as such, let alone any deactivating and life-shortening effects of CO₂.

Applicant respectfully submits that if the skilled person would have a reason to consult Notermann in relation to Finch's disclosures, in the absence of any reference in Finch to (effects of) CO₂, he would have motivation only to follow Notermann's general teaching that the presence of leachable sodium tends to improve the efficiency of the system". It is emphasized that this general teaching is consistent with the teaching by Finch that the activity of the catalysts may, in many instances, be further materially increased or promoted by the addition of small amounts of a sodium compound" (column 4, lines 44-47). Thus, the skilled person is discouraged from applying a carrier with a low content of leachable sodium, let alone a carrier with a low sodium solubilization rate, e.g. no greater than 5 ppmw/5 minutes. This clearly leads away from the present invention.

In the absence of any reference in Finch to (effects of) CO₂, the skilled person would not find any motivation to apply Notermann's specific teaching which aims at diminishing deactivating and life-shortening effects of CO₂ by using a carrier with a low content of leachable sodium. Preparing such carriers would also require elaborate procedures such as set out in Notermann's column 13, line 41 - column 14, line 65. As an addition, even if the skilled person would find motivation to apply a carrier with a low content of leachable sodium, then still he would not necessarily arrive at using a carrier with a low sodium solubilization rate, e.g. no greater than 5 ppmw/5 minutes.

In view of the above, it is respectfully submitted that the rejections, based on Finch and Notermann, are not based on a proper consideration of Notermann, and that a proper consideration of Notermann in its entirety leads to the conclusion that Notermann leads away from the present invention.

Thus, claims 1-6, 9-19, 22-34, 37-43, and 46-49 are unobvious and patentable over Finch in view of Notermann. The non-obviousness of the present claims over Finch and Notermann can be stated independent of whether or not Notermann's carrier inherently meets the solubilization rate instantly claimed.

The fourth issue presented upon this appeal is whether claims 7-8, 20-21, 35-36, and 44-45 are patentable under 35 U.S.C. § 103(a) over Finch in view of Notermann as applied to claims 1-6, 9-19, 22-34, 37-43, and 46-49, in the aforementioned issue under 35 U.S.C. § 103(a), and further in view of Matusz. In raising the present issue, the Examiner relied upon the modified disclosure of Finch, discussed above, as applied to claims 1-6, 9-19, 22-34, 37-43, and 46-49.

As shown above, the Examiner has not met the burden of proof necessary to support a theory of inherent disclosure by Notermann. Further, as shown above, Notermann and Finch cannot be properly combined in the manner proposed by the Examiner in the rejection of claims 1-6, 9-19, 22-34, 37-43, and 46-49 over these references. Thus reliance upon Finch in view of Notermann, as applied above by the Examiner to claims 1-6, 9-19, 22-34, 37-43, and 46-49, cannot properly support the rejections under 35 U.S.C. § 103 of claims 7-8, 20-21, 35-36, and 44-45.

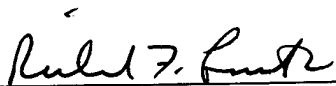
As discussed previously, Finch, Notermann, and Matusz are all silent with respect to sodium solubilization rates. Because each of the presently rejected claims involves "a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes," any combination of these cited references could not teach or suggest the subject matter of claims 7-8, 20-21, 35-36, and 44-45. Therefore, these claims are unobvious and patentable over the cited art.

CONCLUSION

For the reasons set forth above, the Applicants request that the Board overturn the Examiner's rejection.

Respectfully submitted,

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APPENDIX

1. A process for preparing a catalyst, said process comprising:
selecting a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes;
depositing one or more catalytically reactive metals comprising silver on said carrier; and
depositing one or more promoters selected from sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, rare earth metals, and combinations thereof prior to, coincidentally with, or subsequent to the deposition of said one or more catalytically reactive metals.
2. A process according to claim 1 wherein the one or more promoters comprise lithium.
3. A process according to claim 2 wherein the one or more promoters comprise in addition a Group IA metal which is selected from potassium, rubidium, cesium, sodium, and combinations thereof.
4. A process according to claim 1 wherein the one or more promoters are selected from sulfur, phosphorus, boron, fluorine, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.
5. A process according to claim 4 wherein said Group IIA metal is selected from magnesium, calcium, strontium, barium, and combinations thereof.
6. A process according to claim 4 wherein said Group VIII metal is selected from cobalt, iron, nickel, ruthenium, rhodium, palladium, and combinations thereof.
7. A process according to claim 4 wherein said rare earth metal is selected from lanthanum, cerium, neodymium, samarium, gadolinium, dysprosium, erbium, ytterbium, and combinations thereof.
8. A process according to claim 4 wherein the one or more promoters comprise rhenium.
9. A process according to claim 1 wherein said sodium solubilization rate has been achieved by a means effective in rendering ionizable species on the carrier surface ionic and removing that species, or rendering the ionizable species insoluble, or rendering the ionizable species immobile.

10. A process according to claim 9 wherein said means is selected from washing, ion exchange, volatilizing, impurity control, precipitation, sequestration, and combinations thereof.
11. A process according to claim 1 wherein said metal is deposited on said carrier by submersing said carrier in an impregnation solution wherein a hydrogen ion activity of said solution is lowered.
12. A process according to claim 11 wherein said hydrogen ion activity is lowered by addition of a base to said impregnation solution.
13. A process for preparing a catalyst suitable for the vapor phase production of epoxides, said process comprising:
- selecting a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes;
 - depositing one or more catalytically reactive metals comprising silver on said carrier; and
 - depositing one or more promoters selected from sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, rare earth metals, and combinations thereof prior to, coincidentally with, or subsequent to the deposition of said one or more catalytically reactive metals.
14. A process according to claim 13 wherein the one or more promoters comprise lithium.
15. A process according to claim 14 wherein the one or more promoters comprise in addition a Group IA metal which is selected from potassium, rubidium, cesium, sodium, and combinations thereof.
16. A process according to claim 14 wherein the one or more promoters comprise in addition a Group IA metal which is cesium.
17. A process according to claim 13 wherein the one or more promoters are selected from sulfur, phosphorus, boron, fluorine, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.
18. A process according to claim 17 wherein said Group IIA metal is selected from magnesium, calcium, strontium, barium, and combinations thereof.
19. A process according to claim 17 wherein said Group VIII metal is selected from cobalt, iron, nickel, ruthenium, rhodium, palladium, and combinations thereof.

20. A process according to claim 17 wherein said rare earth metal is selected from lanthanum, cerium, neodymium, samarium, gadolinium, dysprosium, erbium, ytterbium, and combinations thereof.
21. A process according to claim 17 wherein the one or more promoters comprise rhenium.
22. A process according to claim 13 wherein said sodium solubilization rate has been achieved by a means effective in rendering the ionizable species ionic and removing that species, or rendering the ionizable species insoluble, or rendering the ionizable species immobile.
23. A process according to claim 22 wherein said means is selected from washing, ion exchange, volatilizing, impurity control, precipitation, sequestration, and combinations thereof.
24. A process according to claim 13 wherein said carrier is an alumina-based carrier.
25. A process according to claim 24 wherein said alumina-based carrier is α -alumina.
26. A process according to claim 13 wherein the amount of a Group IA metal, if present, is in the range of from about 10 ppm to about 1500 ppm, by weight of the total catalyst, expressed as the metal; the amount of a Group VIIB metal, if present, is less than about 3600 ppm, by weight of the total catalyst, expressed as the metal; and the amount of silver is in the range of from about 1 percent by weight to about 40 percent by weight of the total catalyst.
27. A process according to claim 13 wherein said carrier has a surface area in the range of from about 0.05 m²/g to about 10 m²/g.
28. A catalyst comprising a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes; and deposited on said carrier a catalytically effective amount of one or more catalytically reactive metals comprising silver, and one or more promoters selected from sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.
29. A catalyst according to claim 28 wherein the one or more promoters comprise lithium.

30. A catalyst according to claim 29 wherein the one or more promoters comprise in addition a Group IA metal which is selected from potassium, rubidium, cesium, sodium, and combinations thereof.
31. A catalyst according to claim 29 wherein the one or more promoters comprise in addition a Group IA metal which is cesium.
32. A catalyst according to claim 28 wherein the one or more promoters are selected from sulfur, phosphorus, boron, fluorine, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.
33. A catalyst according to claim 32 wherein said Group IIA metal is selected from magnesium, calcium, strontium, barium, and combinations thereof.
34. A catalyst according to claim 32 wherein said Group VIII metal is selected from cobalt, iron, nickel, ruthenium, rhodium, palladium, and combinations thereof.
35. A catalyst according to claim 32 wherein said rare earth metal is selected from lanthanum, cerium, neodymium, samarium, gadolinium, dysprosium, erbium, ytterbium, and combinations thereof.
36. A catalyst according to claim 32 wherein the one or more promoters comprise rhenium.
37. A catalyst suitable for the vapor phase production of epoxides comprising a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes; and deposited on said carrier a catalytically effective amount of one or more catalytically reactive metals comprising silver, and one or more promoters selected from sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.
38. A catalyst according to claim 37 wherein the one or more promoters comprise lithium.
39. A catalyst according to claim 38 wherein the one or more promoters comprise in addition a Group IA metal which is selected from potassium, rubidium, cesium, sodium, and combinations thereof.
40. A catalyst according to claim 38 wherein the one or more promoters comprise in addition a Group IA metal which is cesium.
41. A catalyst according to claim 37 wherein the one or more promoters are selected from sulfur, phosphorus, boron, fluorine, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.

42. A catalyst according to claim 41 wherein said Group IIA metal is selected from magnesium, calcium, strontium, barium, and combinations thereof.
43. A catalyst according to claim 41 wherein said Group VIII metal is selected from cobalt, iron, nickel, ruthenium, rhodium, palladium, and combinations thereof.
44. A catalyst according to claim 41 wherein said rare earth metal is selected from lanthanum, cerium, neodymium, samarium, gadolinium, dysprosium, erbium, ytterbium, and combinations thereof.
45. A catalyst according to claim 41 wherein the one or more promoters comprise rhenium.
46. A catalyst according to claim 37 wherein said carrier is an alumina-based carrier.
47. A catalyst according to claim 46 wherein said alumina-based carrier is α -alumina.
48. A catalyst according to claim 37 wherein the amount of a Group IA metal, if present, is in the range of from about 10 ppm to about 1500 ppm, by weight of the total catalyst, expressed as the metal; the amount of a Group VIIB metal, if present, is less than about 3600 ppm, by weight of the total catalyst, expressed as the metal; and the amount of silver is in the range of from about 1 percent by weight to about 40 percent by weight of the total catalyst.
49. A catalyst according to claim 37 wherein said carrier has a surface area in the range of from about 0.05 m²/g to about 10 m²/g.